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ABSTRACT

While intelligence plays an important role in understanding human behavior, it is through creativity that we can understand a human's ability to cope with challenging situations in novel and appropriate ways. This fastback explores theories and research on creativity. Its chapters are: (1) "Looking for Creativity," describing six multidisciplinary approaches to the study of creativity; (2) "Investing in Creativity," discussing traits of creative people and the importance of a supportive environment; (3) "Do Rewards Undermine Creativity?" exploring whether extrinsic rewards dampen children's creativity; (4) "Intelligence, Personality, and Motivation," addressing how these three constructs relate to instructional effectiveness; (5) "The Emotional Literacy Movement," discussing aspects of emotional intelligence and its instruction; and (6) "Recommendations for Education Programs," providing perspectives from several theorists on how education can better foster higher-level cognitive skills and creativity. (Contains 48 references.) (EV)

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Rethinking Creativity

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Rethinking Creativity

by
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Looking for Creativity

While psychologists have tried to explain the behavior of just about every human anomaly, they have neglected research on the people whom we hold in the highest regard, creative people. According to Sternberg and Lubart (1996), fewer than one half of one percent of the articles indexed in *Psychological Abstracts* from 1975 to 1994 concerned creativity. McDonough and McDonough (1987) surveyed 1,200 accredited U.S. colleges and universities and found that only 76 offered a course in creativity. If we look at introductory psychology textbooks, we also discover that the subject of creativity is barely covered, though many pages are devoted to intelligence.

Granted, intelligence plays an important role in understanding human behavior. However, it is through creativity that we can understand a human's ability to cope with challenging situations in novel and appropriate ways. As Sternberg and Lubart argue, "To the extent that we care about the psychological importance of a construct, and not just past success in measuring it, creativity is probably at least as important as intelligence" (1996, p. 678).

Sternberg and Lubart attempt to explain the various reasons for the lack of solid empirical research on creativity and offer a number of promising multidisciplinary approaches to the study of creativity. They report that six approaches — mystical, pragmatic, psychodynamic, psychometric, cognitive science, expert/novice, and social-personality — have been used to study creativity. Within the context of each of these approaches, they offer a number of explanations for the neglect of creativity as a research topic.

Mystical. Creativity often has been viewed as mystical in nature, as a divine intervention. The creative person was seen as engaging in a deep spiritual process that was unexplainable. Many creative persons themselves have difficulty explaining their own creative processes.

Pragmatic. Another and rather damaging approach to the serious study of creativity is what Sternberg and Lubart refer to as the pragmatic approach. This approach to studying creativity has been associated with the commercial work of DeBono (1971, 1985, 1992), brainstorming techniques, and Leo Buscaglia's (1972) study of love. For the most part, this work has a questionable basis in psychological theory and does not provide much insight into creativity. It merely provides people with pragmatic strategies for developing their creativity. This nonempirical approach to the study of creativity may inspire some to take a class at their local YMCA, but it contributes little, if anything, to developing serious psychological studies related to creative processes.

Psychodynamic. Those associated with the psychodynamic approach view creativity as the result of tensions

between conscious reality and unconscious drives. Freud, the pioneer of this research, centered his theories of creativity on the study of great artists. Although this approach represented the first major systematic attempt to study creativity in the 20th century, it was not well accepted because of its reliance on the unconscious, which is difficult to measure. These approaches were not associated with formalized clinical trials and controlled experimental methods. Although these psychodynamic theories may not have been well received within the scientific community, they did lay much of the groundwork for contemporary research. However, Sternberg and Lubart suggest, psychodynamic views currently are not at the center of scholarly activity.

Psychometric. It is difficult to define and observe creativity. Sternberg and Lubart note that most of the research consists of case studies of highly creative people ("big C people") who are either dead or inaccessible for any type of controlled research. For practical purposes many creativity researchers shifted their focus to studying everyday people ("little c people") using a psychometric approach. Tasks in "divergent thinking" and other problem-solving skills became widely used for measuring creativity. The use of these creativity measurement tools and an abundance of subjects (that is, everyday, little c people) facilitated more research in this area. However, critics of this approach question whether these brief tests, which were designed to measure fluency, flexibility, originality, and elaboration, can capture the concept of creativity or provide insight into the study of eminent (big C) levels of creativity. Should

the characteristics associated with the creativity of masters and everyday people be considered in the same category? This debate continues to hamper the psychometric study of creativity.

Cognitive Science. Sternberg and Lubart contend that another reason creativity is not studied further is because it tends to be subsumed and marginalized under the study of such cognitive processes as intelligence, memory, and perception. Weisberg (1986) argues that creativity involves essentially ordinary cognitive processes that yield extraordinary results. Distinctions are not made among thinking, problem solving, and creativity.

Sternberg and Lubart discuss the "disciplinary subsumption" of creativity. Creativity often has been viewed as a subtopic of either cognitive or social psychology. Those investigators associated with the cognitive science approach have targeted their research on the examination of the mental representations and cognitive processes underlying creative thoughts.

Expert/Novice. Much of this work has focused on the documentation of similarities and differences between expert and novice problem-solvers (Ericsson and Charmes 1994; Sternberg 1998). This approach has led to the development of computer simulations to reproduce human-like thoughts when solving problems.

Social-Personality. Investigators associated with the social-personality approach focus their attention on motivation, personality, and the sociocultural environment as sources of creativity. Certain personality traits that characterize creative people have been identified. These traits include risk taking, independence of judgment,

self-confidence, attraction to complexity, self-actualization, and an aesthetic orientation. The relevance of intrinsic motivation (Maslow 1954, 1968; Rogers 1961) and the role of the social environment (Becker 1995) in the creative process also have been studied. Research using cross-cultural comparisons and anthropological case studies has demonstrated a link between creativity and such environmental variables as cultural diversity, war, availability of resources and role models, and competition.

Research on the cognitive and social-personality variables that affect creativity has moved us closer to understanding creativity. However, these two sets of variables tend to be studied in isolation when, in fact, they are very much intertwined and should be viewed together.

But first we need to define creativity more clearly and then devise ways to evaluate it. The definition of the term often has been limited to the creative works produced in the arts and sciences. However, the definition of creativity can be broadened to include just about any profession or endeavor. For example, Sternberg and Lubart (1996) define creativity as the ability to produce work that is both novel and appropriate.

Once we have defined creativity, we need to identify criteria to evaluate it. Sternberg and Lubart claim that "there is no single objective standard for what constitutes creative performance" (p. 685). Who is the ultimate judge of creativity?

Investing in Creativity

Research on creativity is vital to current school and workplace reform efforts. Our society needs to carefully examine the way we are teaching. Are we focusing our efforts on teaching content? Are we teaching students to be active learners, critical thinkers, problem solvers, and risk takers? The pairing of cognitive approaches and social-personality approaches may provide us with a more comprehensive view of creativity.

In *Creating Minds*, Howard Gardner discusses the importance of providing learners with the opportunity to explore and discover their physical, social, and personal worlds. The knowledge that learners accumulate from this exploration is the "capital of creativity" from which they can draw in later life. Gardner argues that "if children are restrained from such discovering activities, pushed in only one direction, or burdened with the view that there is only one correct answer or that correct answers must be meted out only by those in authority, then the chances that they will ever cast out on their own are significantly reduced" (1993, p. 31).

Gardner reports that highly creative persons exhibit a common set of personality traits. Taken as a group,

creative persons appear to be independent, self-confident, unconventional, and alert. They appear to have ready access to their unconscious processes, they are ambitious, and they have a great commitment to their work. The seven eminent creators studied by Gardner (Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi) were reported to be so caught up in their work that they sacrificed all, especially the possibility of a well-rounded existence. Each creator put his or her work at center stage. Some made a decision to undertake an ascetic existence (Freud, Eliot, Gandhi). Others developed a self-imposed isolation (Einstein and Graham). Picasso reportedly exploited those present in his world. Stravinsky had many combative relationships with others. None of Gardner's subjects was reported to have a great need for friends who were treated as equals. In fact, they reportedly used others to advance their work and broke off their relationships when they were perceived to be no longer useful.

In Vera John-Steiner's book, *Notebooks of the Mind*, she eloquently explains the importance of building on the continuity of human knowledge, while avoiding repetition and rediscovery, to achieve novel insights. "The shaping of a distinctive voice in the sciences and in the arts requires a profound knowledge of the conventions of one's discipline and of the invisible tools of the mind" (1985, p. 198).

John-Steiner claims that imagery and visual expressions reflect the uniqueness of our lives. Images are hard to standardize. In addition, taking pictures and keeping journals and diaries represent ways of ordering our

reactions to the world. These activities allow us to place our ideas and feelings in a concrete form outside ourselves. They break our isolation.

Many artists and writers resist a rigidly conscious and verbal approach to creativity. John-Steiner (1985) claims that language is double-edged: Words provide a fuller view of reality, but words can also fragment reality. Thus many writers rely heavily on the sounds, the cadence of words and sentences. Other writers reportedly draw heavily on visual imagery and stress the importance of the use of metaphors. In scientific work, knowledge needs to be transformed through experimental and intellectual inquiry into a new, more adequate representation. Steiner claims that discipline — the structures that creative individuals impose on themselves — is one of the most neglected areas in the study of creativity.

Behaviorists have opposed theories of thought and creativity that say these processes are highly visual. They claim that thinking takes place primarily through the use of internalized language and consider imagery to be subjective and highly inferential. However, in *The Making of a Scientist* (1953), Anne Roe reports that biologists and physicists express a preference for visual modes of thought, while social scientists report a preference for inner speech as their dominant mode of cognitive representations. In sum, language and thought perhaps are best viewed as neither identical nor completely independent components of the mind. John-Steiner states: "It is through making explicit not only what is new inside one's mind, but also what is the implicit back-

ground of ideas, knowledge, and beliefs that novelty and insight arises" (1985, p. 139).

Finally, it should be noted that John-Steiner's interviews with scientists indicate that scientists emphasize the role of wonder, an interest in observing nature, a playful and exploratory approach to ideas, a willingness to tolerate long hours of solitude, and courage to make mistakes. Most of the scientists interviewed by John-Steiner indicated that they had a continuing need to combine solitary labor with some nurturing connection with others. They reported that they sought out opportunities to exchange ideas with others. Intuitive thinking reportedly depends on familiarity with a discipline. This well-developed knowledge base is believed to represent a systematic integration of ideas that serves as a context within which to develop novel thoughts.

A supportive school and workplace environment does appear to be necessary for the development of creativity. The multiple resources (intellectual abilities, knowledge, styles of thinking, personality characteristics, motivation, and environmental supports) postulated by Sternberg and Lubart (1996) need to be developed and interconnected in order for creativity to occur. Sternberg and Lubart do note that merely possessing these six resources does not ensure creative success. They describe certain thresholds that need to be achieved in order for creativity to be possible. For example, a certain level of knowledge must be acquired regardless of the levels reached in the other components.

Intrinsic motivation also plays a role in the creative individual's pursuit of an idea. Teresa Amabile (1982,

1983) has shown that creative solutions to problems occur more often when individuals engage in an activity for its sheer pleasure than when they do so for possible external rewards.

Do Rewards Undermine Creativity?

Western teachers and workplace trainers consistently emphasize the importance of individuality (Cascio 1995; Colarelli 1998). In modern times, as mass production has spread from industry to education and child rearing, there seems to be an even greater urgency to place specific significance on this view because our society appears to stifle individuality and creativity. Thus every learner is considered to be unique with a set of special capabilities. From this point of view, society has the obligation to nurture the remarkable power in every human being to achieve individualized fulfillment and personal satisfaction.

Abraham Maslow, one of our most outstanding humanistic theorists, claimed that every human being has a basic need for completeness and justice. We have the innate ability to reach these goals even if we are challenged by personal problems. Self-actualization can be achieved by allowing our natural, positive inclinations to lead the way. Similarly, Carl Rogers described self-actualization in the following fashion: "I would reaffirm . . . my belief that there is one central source of energy in the human organism; that it is a function of the whole

organism rather than of some portion of it; and that it is perhaps best conceptualized as a tendency toward fulfillment, toward actualizing, toward maintenance, and enhancement of the organism" (1961, p. 56).

The push to achieve self-actualization is the spirit that defines human learning and sets humans apart from other creatures. There is a remarkable power latent in every human being, a magnificent potential that is waiting to be used for outstanding accomplishments. If we recognize the gifts that we have, we will have greater appreciation for our enormous talents and responsibilities.

Most of us probably would support the notion that our personalities are created by a delicate balance between nature and nurture. Part of a person's character is intrinsic, and part is a result of training and environmental influences. In addition, a person with certain character traits may be able to achieve a goal while a person with other character traits may struggle to do so. However, regardless of the composition of one's character, a person has some capacity to determine his or her own behavior; freedom of choice exists in everyone. Our tendency toward self-actualization assists us in overcoming the negative obstacles that block our paths.

However, there are actions that teachers and others can take that will negatively affect a student's individuality and creativity. In particular, the use of extrinsic rewards may dampen a student's creativity. Extrinsic rewards can undermine the student's intrinsic interest in a subject or activity and smother the student's potential for producing outstanding accomplishments

(Deci 1975; Deci and Ryan 1985; Lepper et al. 1973, 1996; Lepper and Greene 1975).

Schwartz explains: "reinforcement has two effects. First, predictably, it gains control of an activity, increasing its frequency. Second . . . when reinforcement is later withdrawn, people engage in the activity even less than they did before reinforcement was introduced" (1990, p. 11). In a similar vein, Condry maintains that individuals who have been offered rewards "seem to work harder and produce more activity, but the activity is of lower quality, contains more errors, and is more stereotyped and less creative than the work of comparable nonrewarded subjects working on the same problems" (1977, p. 466).

Most lay people also believe that rewards (reinforcements) create a sense of being controlled by others and thus reduce interest and creativity. Our innate nature to achieve is trampled by the forces of nurture which are represented by enticing rewards. Being manipulated by others will destroy creativity and individualism. If one accepts these conclusions, the effect on education is enormous. Many teachers would desperately search for innovative, non-reward-based techniques to stimulate and maximize productivity.

On the other hand, Eisenberger and Cameron (1996) and Cameron and Pierce (1994) claim that the belief in "the detrimental effects of reward" stems from a flawed view of human nature. They examined 100 studies and reported that the evidence revealed a "considerable diversity of results." The authors reported that the variability of findings was likely to be a result of one or more

of the following conditions: the differences between rewarded and nonrewarded groups are small relative to individual differences within groups; the group differences are actually random variations from a true difference that falls close to zero; and the group differences are greatly influenced by the details of how the rewards are administered. Eisenberger and Cameron (1996) claim that the detrimental effects of reward occur only under highly restricted, easily avoidable conditions. They also argue that positive effects of rewards on generalized creativity are easily attainable using procedures derived from behavior theory.

For example, in one study (Lepper et al. 1973) the researchers offered preschoolers the option to draw with felt-tip markers. The investigators randomly split the children into three groups. One group was told that they would be rewarded for drawing a picture for a visitor. The second group became the surprise recipients of the same reward for their drawings. The third group was not rewarded for their artwork. The investigators secretly observed the preschoolers free-play activities for several days. They reported that the first group spent about half as much time drawing with felt-tip markers as the other two groups did. Lepper et al. thus claimed that the expectation of receiving an extrinsic reinforcer for a potentially enjoyable activity could significantly undermine intrinsic interest in the task.

Slavin strongly objected to Lepper and his colleagues' generalization for several reasons: Drawing with felt-tip pens does not greatly resemble a common school task; children enjoy drawing at home but few (even those

interested in regular school subjects) would independently study grammar, math, or science; and virtually all successful artists have been reinforced, at some point, for their efforts in artistic endeavors. Slavin reported that "the use of rewards more often increases intrinsic motivation, especially when rewards are contingent on the quality of performance rather than on mere participation in an activity" (1984, p. 59). He recognized that our entire society, not just our education system, is structured on a reward-and-punishment system. "We are constantly striving to elicit praise and encouragement from the people we respect. Few people work just for the fun of it; they expect to receive a definite reward for their efforts" (p. 61).

According to Eisenberger and Cameron (1996), the research indicates that offering rewards for successful creative performances can increase successful creativity in an entirely different activity. That is to say that success in one area breeds success in another. The self-confidence and reassurance that one gains from accomplishing a rewarded task will help facilitate the necessary development and personal growth to properly tackle other challenging settings.

Eisenberger and Cameron (1996), Cameron and Pierce (1994), and Slavin (1984) all appear to concur that it is desirable to rely on praise and other verbal reinforcements to influence children. A pat on the back and a smile, especially when given by an important individual, can be useful.

In fact, a reward that leads to an inner feeling of satisfaction for a job well done is often more beneficial than

the use of a material reward. When material rewards *are* used, they have been found to be most effective when they are administered intermittently. It is recognized that over-rewarded learners will lose their intrinsic desire. A basic goal of any teacher is to motivate students to be interested in the subject material. The teacher who has used material rewards to successfully inspire a student should gradually reduce material rewards and increase verbal rewards.

Intelligence, Personality, and Motivation

The constructs of intelligence, personality, and motivation have long been considered useful within the context of creativity. In many respects, an understanding of these constructs helps us summarize the challenges faced in a typical instructional setting.

The construct of intelligence has been redefined over the years, but it still loosely continues to represent one's global ability to solve problems and acquire and refine information. However, the measurement of intelligence continues to be elusive. Early assessments of intelligence designed for very young children have been found to be poor predictors of later performance. Later measures of intelligence do not appear to account for many individual differences in work habits, perseverance, or task interests. Systematic observations, clinical interviews, and testing limits can lead to a more complete examination of such differences.

In spite of the difficulties in defining it, intelligence continues to be a useful construct for psychologists and educators who must determine why a particular learn-

er is not achieving effectively. The use of an intelligence test often serves as a starting point for a focused, multifaceted investigation into the overall learning process. It is probably safe to say that lay persons probably will continue to judge one another's behavior as intelligent based on a series of informal observations and interactions. The intelligence construct, though vague, continues to be a highly valued commodity in our society (Neisser et al. 1996; Sternberg 1997).

The construct of personality and the constraints that it may place on the learning process has continuing value to those interested in the study of critical thinking and creativity. How can we create learning environments that will develop and nurture the personality traits commonly associated with creative people (for example, risk taking, independence of judgment, self-confidence, attraction to complexity, self-actualization, and an aesthetic orientation)? The identification of these traits, along with the identification of cognitive styles (introverted/extroverted, field-dependent/field-independent, and reflective/impulsive), may provide us with useful ideas for designing alternative modes of instruction that will build on learners' individual strengths and minimize their deficits or weaknesses. Considering personality differences might lead to thoughtful grouping strategies and the use of cooperative learning situations in which heterogeneous groups of learners can work together, share information and levels of expertise, and increase their knowledge base. Considering personality and related individual differences also could help prevent culturally insensitive reprimands in the school

and workplace and lead to improved evaluation standards. In short, personality probably will continue to be an important consideration for the psychologist and educator in determining the instructional, evaluative, and social needs of each learner.

The construct of motivation also continues to be important. The current conceptualizations of motivation have progressed far beyond the traditional behavioral views associated with classical and operant conditioning models. Today the focus is on the study of cognitive style and attributional pattern variables and their relationship to motivation. A current trend is the cautious use of external rewards and incentives as they may negatively affect performance of highly interesting tasks (Lepper, Greene, and Nisbett 1973; Lepper and Greene 1975; Lepper and Hodell 1989; Lepper, Kervney, and Drake 1996). The use of external, tangible rewards as motivators has been both advocated and criticized. The positive effects have been reported to be short-term; the long-term effects may reduce a learner's investment in high levels of performance. Procedures can be used to decrease learner dependency on rewards by varying schedules of reinforcement and pairing secondary reinforcers that help the learner transition to a self-regulated motivational style. However, as noted in an earlier section of this fastback, considerable controversy continues to prevail in the area (Cameron and Pierce 1994; Eisenberger and Cameron 1996). In general, the concept of motivation also continues to be of particular importance for adults, as managers and administrators continually address issues regarding increasing motivation and performance in the workplace.

In summary, we believe that the constructs of intelligence, personality, and motivation probably will always be somewhat subjective, but important, considerations to instructional designers. It is our recommendation that instructional designers include measures of a learner's ability, personality characteristics, and the desire or need to perform or achieve. These three factors could be of significant value before and during the training period.

The Emotional Literacy Movement

In the final section of Goleman's 1995 book, *Emotional Intelligence*, he cited several statistics related to the increased rates of aggravated assaults, juvenile murders, robberies, and forcible rapes. While most communities appear to have an interest in addressing such concerns, Goleman claimed that we have failed to focus our preventive efforts on emotional and behavioral difficulties. Goleman stated:

> As a society we have not bothered to make sure every child is taught the essentials of handling anger or resolving conflicts positively — nor have we bothered to teach empathy, impulse control, or any other fundamentals of emotional competence. By leaving the emotional lessons children learn to chance, we risk largely wasting the window of opportunity presented by the slow maturation of the brain to help children cultivate a healthy emotional repertoire. (p. 286)

Given the level of "emotional illiteracy" (for example, low levels of empathy and poor emotional self-regulation skills) displayed by many young people, the emotional literacy movement has grown. The emotional literacy

movement has been greatly influenced by Gardner's (1983) theory of multiple intelligences. One type of intelligence in Gardner's system is referred to as intrapersonal intelligence. According to Gardner, intrapersonal intelligence includes such abilities as self-reflection and awareness of one's thoughts and feelings.

It should be noted that the theory of emotional intelligence was postulated by Salovey and Mayer (1990). Their theory, along with Goleman's popularization of their theory, has also influenced the emotional literacy movement.

Mayer and Salovey define emotional intelligence as involving "the ability to perceive accurately, appraise, and express emotion; the ability to assess and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (1997, p. 10). With this definition of emotional intelligence as a model, some schools have developed instructional programs to enhance the emotional literacy of students. Emphasis has been given to the development of such emotional skills as self-awareness, management of feelings, cooperation, and impulse control, which have been reported to be critical in helping learners resist the dangers associated with juvenile murders, aggravated assaults, robberies, and forcible rapes. Emotional illiteracy has been found to be associated with such barriers to learning as aggressiveness, depression, and unwanted pregnancies (Goleman 1995).

Mayer and Salovey (1993) and Goleman (1997) report that emotional intelligence is a subset of social intelligence. Thus it may be a good idea to anchor emotional literacy programs in high-quality social skills training programs to bring about positive changes in school or workplace environments.

Recommendations for Education Programs

What knowledge in psychology is most directly useful in the design and operation of education programs? Some would argue that the most exciting and useful knowledge in psychology is Gardner's (1983, 1993, 1999) work on multiple intelligences. A case can be made for the notion that Gardner's work has provided an impetus to recharge the classroom curriculum, teacher education programs, the design of courses of study, and the preparation of education researchers. In brief, Howard Gardner identified eight types of intelligence that he believes are present in all of us in varying degrees. These types of intelligence are:

1. Verbal/linguistic: the ability to learn and recognize distinctions between words, sounds, and language.
2. Mathematical/logical: the ability to work with numbers, following a sequence of operations, solving word problems, etc.
3. Bodily-kinesthetic: the ability to use the physical body fluidly, to hold objects, and to control movements as a dancer.

4. Musical: the ability to perceive sounds, tones, rhythms, pitch, and variations of these; the ability to sing or to play a musical instrument.
5. Interpersonal: the ability to effectively interact with others, to associate, to perceive others, to express empathy.
6. Intrapersonal: the ability to know oneself, to understand one's strengths, limitations, and motivation.
7. Visual-spatial: the ability to perceive images and to construct, deconstruct, or reconstruct them.
8. Naturalistic: the ability to study and classify objects in the environment.

Gardner's theory of multiple intelligences has heralded a revolution of sorts in the design and operation of education programs targeted at enhancing critical thinking and creativity. First of all, the appropriateness and inclusiveness of standard measures of intelligence (for example, the Stanford-Binet and Wechsler Intelligence Tests) have been questioned by many (Neisser et al. 1996; Sternberg 1997). These tests were designed to measure only verbal and mathematical skills and not the other six types of intelligence studied by Gardner. The standard three-part definition of intelligence (the ability to solve problems, the ability to acquire knowledge, and the ability to reason abstractly) has been around for quite a while (Neisser et al. 1996; Sternberg 1997). Gardner's work has put a new spin on this construct. The result has been to give less emphasis to standardized testing in general and more emphasis to authentic performance measures. From Gardner's point of view, prob-

lems can be solved in many different ways, knowledge can be acquired (and taught) in many different ways, and the ability to reason abstractly can be manifested in many different ways.

In addition to leading to the redesign of assessments from standard classroom written examinations to performances, presentations, diagrams, models, group projects, and portfolios (which Gardner refers to as "processfolios"), his work promotes a redesign of curricula to include lessons or units that incorporate activities directed to all types of intelligence. Gardner recognizes that not every discipline or unit can be configured to include instruction directed at the development of all eight types of intelligence. However, the view is that teachers can become more effective, more versatile, more interesting, and more highly skilled if systematic efforts are made to ensure that instructional activities are provided to enhance multiple forms of intelligence. The assumption is that students can become more highly motivated in classrooms where the same thing doesn't happen every day. Exposing students to a Gardner-based curriculum has considerable potential to nurture critical thinking and creativity.

Csikszentmihalyi (1988) chastises the education community, claiming that many, far too many, students are bored and low-achievers because teachers are boring them. He urges teachers to foster the "flow" of creativity by incorporating varied enriching experiences (and a multitude of them) into the curriculum.

Systematic efforts should be made to teach critical thinking skills, skills that will prepare students for chal-

lenging academic work and challenging careers (Halpern 1995). The assumption is that the diversity afforded by a rich curriculum incorporating Gardner's theory of multiple intelligences and the use of interdisciplinary units of instruction will engender the development of higher-level cognitive skills.

Bruer (1994), McGilly (1996), and Eisner (1998) also address issues related to the design and operation of education programs. Bruer and McGilly believe that we need to focus our attention on learning. They encourage us to use analogies, make models, and design instructional environments in which considerable attention is given to social interactions among our students. Considerable emphasis is given to cognitive, social, and cultural constructivist views of learning. They claim that there needs to be much less emphasis on rote memorization and more emphasis given to the development of problem-solving and critical thinking skills. Eisner (1998) recommends that the curriculum be redesigned to include a variety of activities and assessments that will help students develop the skills to create analogies, models of knowledge representations, and other practical, integrated applications of their knowledge.

Both Gardner and Eisner have worked within the context of art education programs where the development of critical thinking skills was one objective, in addition to such other aspects of art education as the development of study skills, collaboration, research skills, and self-assessment and self-monitoring skills. In many respects, the art education classroom appears to be a near ideal laboratory in which to experiment, test

hypotheses, and articulate theories related to interdisciplinary curricula. From their perspective, the art students are not "empty vessels waiting to be filled up," as some behaviorists suggest. Many art students appear to be highly motivated to do their art and nothing else. The narrowness that so many of them abhor can result from working in isolation or working in only one way throughout a semester. When education programs are designed to foster reciprocal learning, cooperative learning, self- and peer-evaluations, problem-solving skills, and the transfer of knowledge, the school environment is "spiced up" and students' potentials are enhanced. The learning environment becomes a very exciting place in which to study and work.

Eisner (1997, 1998) also recommends that we look at the design and operation of teacher training programs and the programs designed to prepare education researchers. Because the learning environment is changing so rapidly, the teacher education environment must change as well. To prepare teachers and researchers to meet the needs of the changing classroom, training is needed in cognitive psychology, including a focus on theories of multiple intelligence and the application of cognitive, social, and cultural constructivist views of instruction to the classroom. Because more is expected of students, more is demanded of teachers. Teachers must learn to create assessment measures and procedures that reliably evaluate students; they must learn how to enhance components of intelligence; and they must learn how to design and implement lessons that give all types of intelligence a chance to develop. From this cog-

nitive, social, and cultural constructivists' perspective, content knowledge and classroom management skills are no longer enough to prepare a teacher. Eisner claims that by studying the artistic process (the creative process) teachers can achieve a more thorough understanding of the learning process. It is our recommendation that the investigation of what gives rise to cognitively, socially, and culturally constructed interdisciplinary lessons and units of instruction should be at the center of the teacher education and the school curricula.

Finally, Eisner (1997), Constas (1998*a*, 1998*b*), and many others write about the need for education researchers to be trained in the qualitative methods of research. The ability to write well, to perform the tasks connected to narrative methods of inquiry and ethnographic studies, and to combine empirical with qualitative research methods of disciplined inquiry should now be required or expected of all education researchers. It should be noted that narrative inquiry demands a different set of skills than purely quantitative research, and it often demands that the researcher work hand in hand with the classroom teacher as narrative descriptions are constructed and deconstructed. We believe that these cognitively, socially, and culturally constructed theoretical views and approaches to instructional design, taken in combination with multiple methods of inquiry, will enhance critical thinking and creativity in the years to come.

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The girls' basketball team at Sacred Heart Academy in Cleveland, Ohio, strikes a pose in this early photograph, circa 1930.

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